THE MOTOR AGE

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INFORMATION FOR FUTURE BUYERS—IV.

CONCLUSION OF EDITORIAL COMMENT ON THE AUTOMOBILE AND THE INDUSTRY—THE HYDROCARBON CARRIAGE DESCRIBED AND ITS VARIOUS ADVANTAGES AND DISADVANTAGES POINTED OUT—THE PRINCIPLES OF THE GAS ENGINE EXPLAINED

While the results that electricity can produce are well understood, if not the reasons therefor, and while both results and the actual operation of the steam engine are familiar to almost all fairly well read persons, neither the results that are accomplished by the class of engines usually known as hydrocarbon, gas, gasoline and explosive engines, nor the means by which those results are obtained, are understood or known by the average reader. It will not, therefore, be amiss to explain briefly what a gasoline engine is.

The gasoline engine is selected because it is the one commonly used in traction vehicles. The principles involved in its operation are very similar to those employed in the other species of explosive engines (the generic term applied to all of them) and the person who understands the operation of one can readily compass that of the others. The gas engine has been largely used to furnish power for small plants, because, first, of its simplicity and ease of management by persons devoid of any special train-

ing in the management of engines, second, because gas, common every-day fuel or illuminating gas can be easily obtained, and third, because, for small plants, the engines are economical, despite the fact that gas in expensive, as compared with other fuels, when measured through a meter owned by a gas company. This economy is the result of needing no regular engineer, of being able to start the engine instantly and stop it the moment the power is no longer required, and because of the principle of the engine itself.

Expenditures of Energy

To avoid the possibility of being misunderstood, the writer will run the risk of being tediously prolix. Fuel is burned (the first expenditure of energy), which heats a boiler and produces steam (the second expenditure of energy), the steam operates a steam engine (third expenditure), the steam engine sets in motion an electrical dynamo (fourth expenditure), the dynamo generates electricity (fifth expenditure), this electricity is loaded into a storage battery (sixth expenditure), and the battery drives a motor (seventh expenditure). This is what occurs before the energy (or power) is ready to be applied to an electric vehicle, and, in a measure, accounts for the expense of electric traction. The third expenditure of energy has occurred before the steam engine can begin to drive a vehicle. With the gas engine it is different. There is only one expenditure of energy before there is power that is ready to be applied to some useful work. Every time energy is expended in order to convert it into another form, it loses some of its efficiency. It is the very best specimen of storage battery that will give out eighty-five per cent of the energy required to charge it and the ones in common use are of much lower efficiency.

As said there is only one expenditure of energy in the gasoline engine before the power generated is ready to be utilized. No wonder that the gas engine is economical.

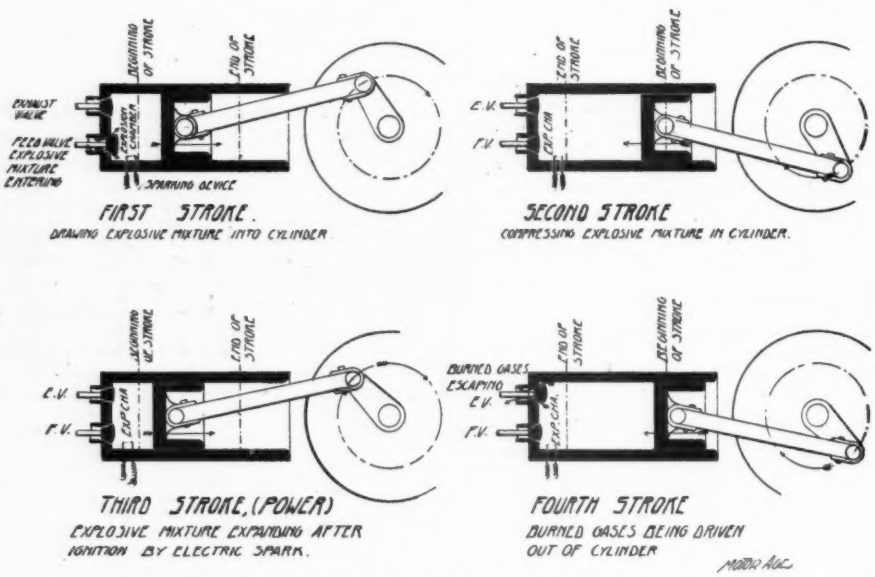


DIAGRAM OF THE FOUR PERIODS OF OTTOCYCLE ENGINE.

Gasoline Engines

In the gas engine of commerce, the supply of fuel comes through the gas company's pipes. In the gasoline engine, by means of an ingenious contrivance, air passes over the surface of a supply of gasoline contained in a tank, and, owing to the volatile property of the liquid, the air becoming impregnated with vapor. This vapor laden air is, in turn, mixed with a sufficient quantity of un-

impregnated air to produce what is termed an explosive mixture, viz., one which contains such proportions of air and gasoline vapor as will explode violently the moment that it comes into contact with fire or very intense heat. In general form the cylinder and piston of the gasoline engine are the same as those of the singleacting steam engine. Once the engine is in operation (see illustration), the action of the piston during one of its outward strokes, draws in a supply of the explosive mixture that completely fills the cylinder. On the return stroke the valve admitting the explosive mixture closes and the momentum of the fly wheel, transmitted through the driving (or crank) shaft and crank, forces the piston to compress the charge of explosive mixture. Thus the piston has passed through all the stages of its action and still has imparted no energy to the driving shaft, which has already made one complete revolution. But at the moment when the charge of explosive mixture is compressed to its utmost, the charge is exploded by the introduction of an electric spark into the cylinder. The charge explodes and the piston is driven outward and imparts a powerful energy to the driving shaft. On the return stroke a valve is automatically opened and the burned gases are allowed to escape. Then the entire operation is repeated, beginning with the drawing in of a new supply of explosive mixture.

Intermittant Power

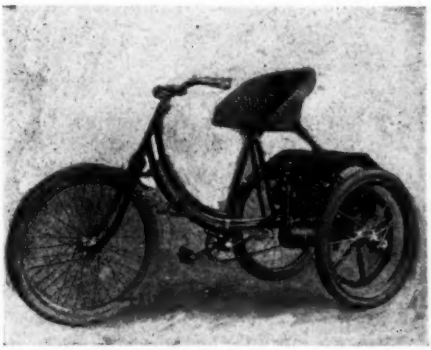
This type of engine is called the Otto-cycle engine or four cycle gas engine, each stroke of the piston being reckoned as a cycle. It will be seen that the engine furnishes power during only alternate revolutions of the crank shaft or only once in each four strokes. During one-fourth of the time (less in actual practice) the piston imparts enough power to the driving shaft and fly wheel to furnish a large amount of useful power and to enable the fly wheel to carry it over the three inoperative strokes.

Different Types

There are numerous variations of the style of engine described but all work on the same ground principle. In some cases the explosive mixture is formed by uniting a measured quantity of liquid gasoline with a measured quantity of air in a heated chamber from which it is admitted to the cylinder. In some engines the explosion is produced by the introduction of a gas flame into the cylinder, or of a platinum tube which is heated to an incandescent point by a gas flame, whereas the electric spark is obtained either from a small dynamo run by the gasoline engine, itself, or from a voltaic (primary) battery, similar to that which operates the doorbell in the reader's home, or even from a small storage battery.

Variations in Construction

There is a vast number of variations in the manner of construction and in



Tinkham Tricycle—American gasoline vehicle.

methods employed to bring about the conditions already described but the conditions are always the same and the results are the same theoretically, although they vary greatly in practice. Some engines (called two cycle engines) diverge so widely from the form here described as to give one effective stroke to each idle stroke or one for every revolution of the driving shaft. In such engines the compression of the explosive mixture is accomplished in a separate cylinder made for the purpose and it is suddenly admitted to the explosion chamber of the working cylinder, instead of being gradually drawn in and gradually compressed by the piston. In the two cycle type the cylinder which compresses the explosive mixture performs no other work. In kerosene engines the liquid is converted

into vapor and gas by mechanical means and heat and the same holds true of alcohol engines. Such is the general construction and operation of the primary engine that is used on the modern automobile.

Advantages and Disadvantages

The disadvantages which are urged against the gasoline engine (the most

Orient Motocycle—American gasoline vehicle.

commonly used) are danger, nauseous odors, noisy exhausts, vibration arising from the sudden and intermittent impetuses given to the engine, the accumulation of dirt, difficulty of regulating the speed, the necessity of starting the engine before mounting the vehicle, and the liability of the engine to fail to work, certainly a formidable array. In practice these faults, some or all of them, are eliminated or reduced to small proportions.

The advantages which are urged in favor of the gasoline rig are cheapness of first cost, cheapness of operating, lightweight, absence of delay in starting, unlimited area of travel, high speed, ease of obtaining a supply of fuel gasoline, the long time which one supply will last, the short time required to replenish it and the durability of the engine.

Little Actual Danger

Considering the disadvantages of the gasoline engine, as applied to vehicles, it will be found that the element of danger is one that has been greatly exaggerated, owing, no doubt, to the bad reputation that gasoline earned for itself during the time in which its qualities were little known. If it were now to be called by some other name the fear of it would be practically nil. Whatever danger there may be is only during the time at which the fuel supply is being replenished, and this may be eliminated by the exercise of ordinary care and the observation of the simplest rules with which almost every farm wife in the country is familiar.

Odors Minimized

The odors arising from the exhaust, containing only partially consumed gasoline vapor, are reduced to the minimum by making the combustion as complete as possible. In practice, the odor of the gasoline engine is noticed only while it is standing still, being lost in the atmosphere when the vehicle is traveling, even at low speed. Some makers even claim that their vehicles are absolutely odorless. While not gainsaying these statements, The Motor Age will not undertake to endorse them until after having witnessed an actual demonstration of the fact, which, in the present state of the industry is a difficult matter, as all makers are so rushed with

Mueller Wagon—American gasoline vehicle.

orders that their vehicles are delivered to customers as soon as completed.

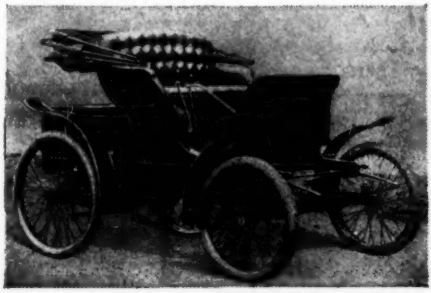
Noise and Vibration

The noise of the exhaust, as in the steam engine, has been reduced to an unimportant factor by "mufflers," the use of which, while detracting slightly from the actual efficiency of the vehicle as judged from the consumption of fuel, is immaterial, owing to the extremely low cost of operating. Vibration is reduced by the use of heavy fly wheels and

by the use of two or more cylinders operating against each other or giving a reduced inpetus more frequently. The disadvantage of dirt is also reduced to a small factor by encasing the parts liable to collect dirt by dust proof coverings.

Hard to Regulate Speed

The regulation of the speed is a matter that has given engineers their most



Winton Wagon—American gasoline vehicle.

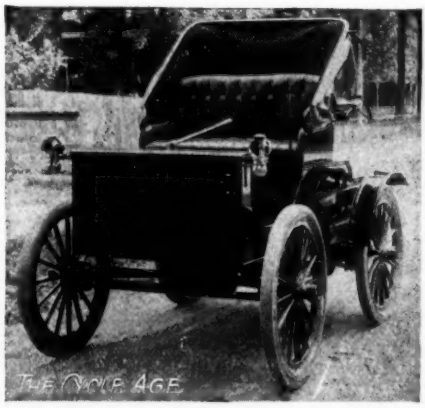
knotty problem. The gasoline engine works at its best when run at high speed, necessitating a great reduction before the power is applied to the driving wheels of the vehicle. If this reduction of speed be accomplished by positive devices, such as gear wheels then there must be a sudden change of speed necessitated by the change from one set of gear wheels to another. This is liable to be attended with noise and an undesirable wearing, or even breakage, of the parts, although in some vehicles excellent results are obtained. This may be obviated by the use of friction gears, which, however, are mechanically notorious as being wasteful of power, a feature which, however, does not apply with great force to gasoline vehicles on account of the cheapness of the fuel which furnishes the power. Indeed, eminently satisfactory results have been obtained by the use of friction gears, which, it must be understood, are capable of gradually increasing or diminishing the speed in the exact degree that may be desired.

Regulating By Explosions

There is another method which is largely employed to regulate the speed, and this is operative in the cylinder of the engine and is performed in a variety of ways. One is that of igniting the explosive charge later than the normal time; one consists of admitting the same quantity of air but a less quantity of gasoline vapor, and one of admitting a less quantity of explosive mixture consisting of the normal proportions of air and vapor. The results of all three of these methods is the same, viz., a less powerful impetus is imparted to the piston and driving shaft, the same result that is accomplished when a smaller charge than usual of steam is admitted to the cylinder of a steam engine. The objection to this method of speed regulation which is usually accompanied also by gearing devices, is the imperfect combustion resulting in disagreeable odors, and a slight added expense, a small item, not to mention the liability of the charge not to explode at all. In practice, however, these drawbacks have been partly overcome.

Difficulty of Starting

From the nature of the engine, it must be set in motion by some external power before its cycles of function become operative, one upon the other. This ne-



Haynes-Apperson Carriage—American gasoline vehicle.

cessitates, in some of the vehicles, the starting of the engine by hand before the driving shaft is connected with the driving wheels, the connection being made after the user has mounted the vehicle. In other carriages there is an arrangement by which a lever at the seat of the vehicle is used to start it. This difficulty has been so far overcome in the

better gasoline vehicles as to be no drawback worthy of consideration.

Overheating Problem

There is one difficulty to be overcome in the construction of gasoline engines that has caused builders endless trouble, and that is, the tendency of the cylinders of the engine to become overheated. The explosive mixture rises to a temperature of about 2,900 degrees Fahrenheit during the explosion. It is the very rise in temperature that enables the engine to do its work. Theoretically this high temperature would be no drawback if it were all imparted to the cylinder. In practice it creates trouble that must be overcome. This is usually done in one of two ways. Either the cylinder is surrounded with a jacket through which circulates a supply of water which is artificially cooled so that the supply will not require too frequent replenishing, or else the cylinder is constructed with a large number of thin fins cast on it, which very largely increase the surface of metal to radiate heat. The latter expedient is, naturally, the more desirable one, provided it works satisfactorily, but it can be successfully applied only to small cylinders. Where water cooling is employed, weight is added and the necessity of occasionally replenishing the supply of water is created.

Objections Being Overcome

It will be seen that while the gasoline engine presents, at first, a long list of objections to its use in carriages, it is sufficiently docile to be susceptible of taming, and, with hundreds of brainy engineers working to eliminate its faults, it is rapidly approaching the point where it will give at least good satisfaction and will double discount the horse. It will also be seen that it has so many possible faults that the purchaser must be as wary as a horse trader in order to avoid becoming the owner of a vehicle of vicious tendencies.

Substantial Advantages

As to the good qualities which have been enumerated, they are all substantial and their value has been often demonstrated. In price gasoline vehicles for two persons may be had from $700 up. The expense of operating is as low as that of the steam vehicles, less than half of one cent per mile. A two passenger vehicle can be had weighing less than 800 pounds. More than 100 miles can be covered before it is necessary to replenish the supply of gasoline and twenty-five or more miles can be covered in an hour.

In conclusion it may be well to state that the reader who masters the few simple facts set forth in the foregoing will possess a vastly greater fund of information about the automobile problem than the average man. In succeeding numbers of The Motor Age problems which have here been passed over with a few words will be considered more at length. An understanding of the ground principles of the automobile problem will prove of value to any person who is seriously considering the purchase of a horseless vehicle. It will be the endeavor in these succeeding articles to entirely avoid the use of merely mechanical terms and to make the explanations so clear and simple that they cannot be misunderstood.

ELECTRICAL MEASUREMENT

DESCRIPTION OF THE VARIOUS DIFFICULTIES INCIDENT TO ELECTRICAL MEASUREMENT IN AUTOMOBILISM—INVOLVES A KNOWLEDGE OF BOTH ELECTRICITY AND THERMODYNAMICS—FUNDAMENTAL FACTS IN CONNECTION WITH THE PROBLEM

In dealing with the subject of electrical measurement, in reference to motor-vehicles, H. E. Whimpers, Wh. Sc., writes substantially as follows, a few changes being made in the text to adapt it to the usages of America:

There is probably no subject which seems more confusing or more difficult to understand to the average automobile engineer than electrical measurement. The reason for this is very obvious; the engineer who has to do with automobilism is supposed to have a fair acquaintance with the motive power employed, whether steam, gas, oil or electric power, and as the conditions under which these work are, with perhaps the exception of gas and oil, widely different, it practically means that the engineer must have a good working acquaintance with both electricity and thermodynamics, to say nothing of graphic statics or some equivalent way of determining stress. It rarely happens that the circumstances of the engineer are such as to allow him to obtain this knowledge in a very thorough manner, and the object of this article is to state the most fundamental facts in connection with the oft recurring problem of how electrical quantities are measured. Everyone, of course, knows that to bring "watts" to horse-power you divide by 746, and it naturally follows that a kilowatt, being only another name for 1,000 watts, is about 1 1-3 horse-power. This last fact is convenient to remember, as one may roughly say that one kilowatt of electric power can be converted into one horse-power of mechanical power, the extra one-half horse-power being lost in friction and other unavoidable sources of loss.

Unit of Energy

The electrical unit of energy is a kilowatt-hour, or the amount of energy which is obtained in one hour when the constant rate of production of power is one kilowatt. Evidently, one kilowatt-hour is equivalent to about 1 1-3 horse-power hours, and, bearing this fact in mind enables us to readily compare a mechanical source of power with an electrical one.

In dynamical problems we know that a force, say of six pounds, acting through a distance of say five feet, means that work is done to the extent of thirty foot-pounds, or that feet multiplied by pounds gives the result in foot-pounds; similarly in electrical problems volts multiplied by amperes gives watts, thus a current of thirty amperes flowing under a pressure of fifty volts yields power to the extent of 1,500 watts, or about two horse-power. So far mention has only been made of "current" and "pressure"—sometimes called E. M. F. (electro-motive force) or P. D. (potential difference); there is another quality, and that is "resistance." Current is measured in "ampheres," pressure in "volts" and resistance in "ohms." These units have to be so adjusted that current equals pressure divided by resistance.

Measuring Instruments

Current is always practically measured by an instrument called an "ammeter," and which is tested as to accuracy from time to time by a Kelvin current balance, and is graduated directly in amperes. Pressure is measured by a voltmeter, which is in turn standardized by reference to a Clark's cell and a potentiometer; while resistance is measured on an instrument called a "Wheatstone bridge," used in conjunction with some standard resistance coils.

There are also other measuring instruments, such as dynamometers, energy meters. Dynamometers are used to measure power, and are composed of a voltmeter and ammeter acting together, so that their readings multiply and the dial reading gives the power in watts or kilowatts. An energy meter multiplies the power by the time during which it is used, and so an indication of the total energy absorbed is obtained.

Consideration of Heat

So much for measurement of power alone, but the engineer has also (generally unfortunately for him) to deal with heat produced. One of the most important considerations in motor or dynamo design is to calculate the probable loss of power through hysteresis, eddy currents, and friction, and to find the heat equivalent of the whole, balance it against the losses due to surface cooling and ventilation, and find what the steady temperature is likely to be; seeing that dynamos and motors cannot be worked at a temperature even moderately high on account of charring of insulating material, or even of the building materials with which they may be surrounded, to say nothing of the accompanying waste of power. Temperature calculations have also to be entered into in connection with transformers, leading wires and cables, etc., and the basis upon which they all must rest is the determination of "Joule's equivalent."

Joule's equivalent is so called because Joule was the first to measure it, and he found that 772 foot-pounds of mechanical energy were equivalent to the thermal energy given out by one pound of water in cooling through one degree Fahrenheit. This num-

ber has been raised to nearly 780 by other later experimentalists using apparatus of greater refinement and accuracy.

An Example

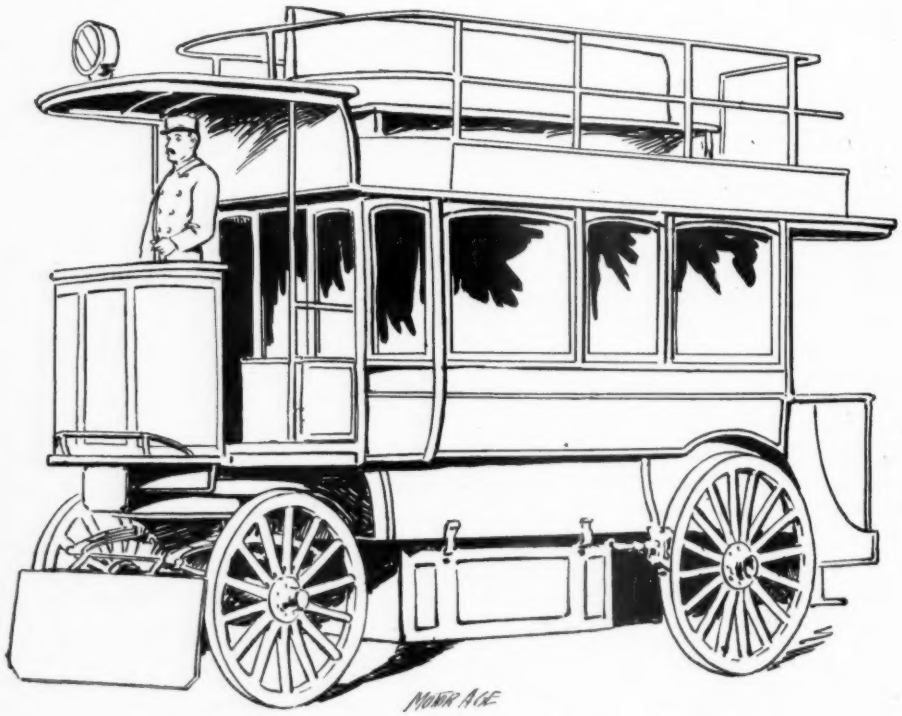
If a current of C amperes flows through a wire of resistance, R, the electric power which is continually absorbed in heating the wire is a number of watts equal to the square of C multiplied by R. This is also true when R is the resistance of any circuit whatsoever. Thus if two plates of, say, copper be immersed in water at such a distance apart that the resistance between the plates is ten ohms, then if a current of twenty amperes flow through the circuit, the pressure between the plates therefore being 200 volts, the power absorbed in heating the water is 200 watts or 0.2 kilowatts.

But we must divide this 200 watts by 746 to get the horse-power, which, multiplied by 33,000 (foot-pounds per minute in one horse-power), and we find that 200 watts equals 8,850 foot-pounds per minute.

Various Heat Losses

Also supposing that the mass of water to be heated be twenty pounds, we have 8,850 foot-pounds per minute absorbed in heating twenty pounds of water, which is at the rate of 442 foot-pounds per pound of water per minute, and, as Joule's equivalent is 780, it follows that every minute the temperature of the mass of water will rise about .6 degrees Fahrenheit, always provided, of course, that the water does not lose its heat by conduction, evaporation or radiation. As, however, heat always is lost by these means, the temperature will rise to a certain amount (which may be estimated if the radiation and conduction constants be known), and then the rate of loss will balance the rate of supply, and the whole will remain at a steady temperature. This calculation is of the same sort as those necessary in the case of dynamos, motors, etc., and it is a simple illustration of the method to be employed in all measurements of heat losses in electrical devices.

In conclusion it must be remembered that the heat produced at the junctions of metals when a current passes, and known as the "Peltier effect," has to be allowed for separately. The correction, even when it exists, is always small.



OMNIBUS OF THE TYPE IN REGULAR PUBLIC SERVICE IN BERLIN.

MUNGER TIRE PATENTS

A SERIES OF THREE PATENTS DESIGNED TO OVERCOME THE DIFFICULTIES ATTENDANT ON THE CONSTRUCTION OF AUTO TIRES—THE INVENTOR SHOWS A CLEAR COMPREHENSION OF HIS SUBJECT AND OFFERS PRACTICAL REMEDIES FOR PRESENT FAULTS

The following patents comprise a series of three covering the inventions of Louis De F. Munger—better known as L. D. or "Birdie" Munger—who has long been known to the bicycle trade as a clever constructor, having been the designer of the first bicycles made by Ames & Frost, the ones put out by the Munger Cycle Mfg. Co. of Indianapolis, and of several other bicycles which earned for themselves and their builder excellent reputations.

Difficulties Overcome

The series of patents cover ideas designed to overcome the oft met difficulties, in vehicle tires, of attaching and detaching in a satisfactory manner, of "creeping" and dragging off the rims, and of chafing and puncturing, when overloaded or subjected to sudden and unusual shocks. It has been found, in practice, that these difficulties have been more than serious.

Cause of Troubles With Tires

The greater weight of autos over bicycles or ordinary conveyances, together with the additional strains inflicted on the wheels and tires above those—as pointed out in the November 14 issue of the Motor Age—of bicycles and ordinary conveyances, have, so far, been found to furnish almost insurmountable obstacles to the construction of an even approximately perfect tire.

With the average tire, the auto driver has found himself confronted with the necessity either of having the tires of huge dimensions, of having them inflated far beyond the point of comfort or of running the imminent risk of puncture, to say nothing of other annoyances which offered no means for being overcome, even at the expense of some other desirable quality.

Ideas Are Clear

In his ideas and in the wording of his applications for patents, Munger has shown a particularly clear comprehension of these difficulties. For the latter reason the Motor Age quotes, further on, very liberally from the patent documents.

Considered Practical

Munger's ideas have been known previous to the issuance of the patents and have been approved as offering a practical solution of the tire problem, by men well posted in the tire business, provided the mechanical difficulties in the way of constructing the tire itself should not prove too great. It is no easy task to make a satisfactory tire of the ordinary construction, and, when the work of adding the two internal ribs is added it becomes doubly troublesome. Time will demonstrate whether or not this difficulty can be satisfactorily overcome.

Patents Are Assigned

It is understood that the National Wheel & Traction Co., to which Munger has assigned the three patents, for a large stock consideration, has ample capital back of it, and, this being the case, it is fair to assume that the mechanical obstacles in the way of manufacturing a commercially valuable tire will be overcome—but probably not without a considerable amount of experimenting.

No such difficulties interpose themselves in the way, however, of attaching and detaching the tire to the rim, as proposed by Munger, and this feature, alone, should prove valuable.

The following are the patents:

Description of Patents

638,588.—To Louis De F. Munger, New York, N. Y., assignor to the National Wheel & Traction Co., same place.—The following extracts from the patent papers will best give a clear idea of the device covered by this patent, which device is also a part of patent 638,590, which is given in detail further on:

"My invention relates to improvements in pneumatic or elastic cushion-tires for vehicle-wheels, its object being to provide an improved means of attachment

of the tire to the wheel rim or felly and specially designed for the driving-wheels of automobiles.

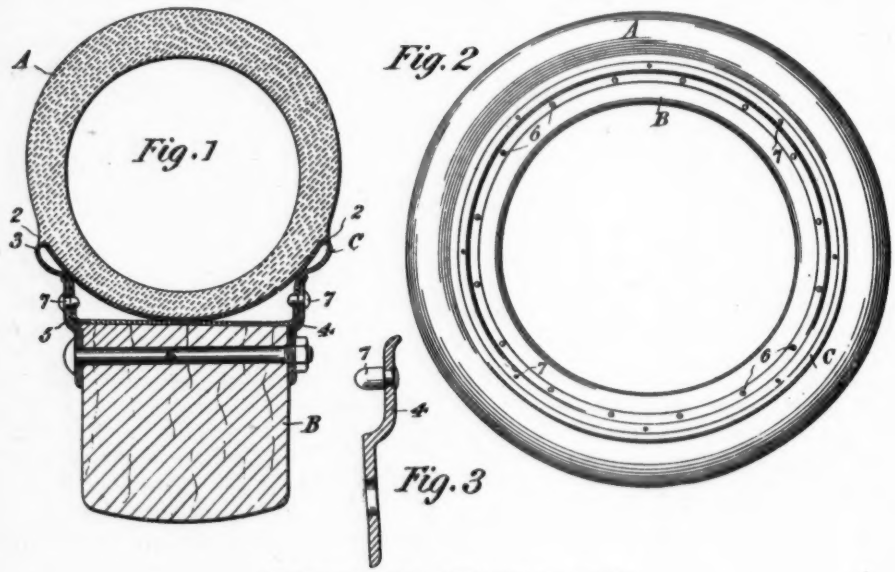
Construction of Tire

"To this end my invention consists, essentially, in constructing the tire with a metallic base or band permanently secured thereon, as by vulcanizing in the manner hereinafter described and claimed, which serves as the means for attaching the tire to the wheel. Thus the tire-base instead of the tire is directly attached to the wheel, thereby preventing weakening of or injury to the tire by the attaching devices. It has been practically demonstrated that the cement and other bolts securing the base, and yet that the base and tire can be readily and quickly attached to and detached from the felly without the use of special apparatus and while keeping the tire in a state of inflation.

Description of Parts

"In the accompanying drawings, forming part of this specification, Figure 1 is a cross-section of a tire and a wheel-rim fitted with my improvement. Fig. 2 is a side elevation of a wheel-rim and tire secured thereon by my improvement, and Fig. 3 is a detail of the securing devices.

"In the drawings, A represents the tire, B the wheel rim or felly, and C the metal-



MUNGER'S TIRE ATTACHING DEVICE.

means commonly used for attaching pneumatic tires to bicycle-wheels and the like are inefficient for heavy traction-vehicles. It has also been found where fittings for fastening the tire to the wheel-rim have been built into the tire itself that such construction greatly weakens the tire, and the tire being secured only at individual points to the wheel-rim the strain at these points has destructive effect upon the tire.

Attaching and Detaching

"My invention also comprises such a construction of the felly and tire base that these parts will be practically self-united, exerting but slight strain on the

lic base of the tire. This base C, as shown, is made, preferably, of an annular metal tube formed by rolls or otherwise, so that its outer surface or periphery conforms to the shape of the inner periphery of the tire and the inner periphery of the tube conforms to the face of the wheel rim or felly to which it is to be attached. The preferred construction of these various parts is illustrated in Figure 1, the tire being circular in cross-section and the face of the wheel rim or felly being flat. The face of the felly is slightly inclined or at an angle with the axle, the outer diameter of the wheel being the smaller to form a tapering fit for the tire-

base to assist in the work of slipping the tire on or off the wheel for the purpose of attachment or detachment, this angle being slight and hardly discernible in the drawings. The outer side of the base is also longer than the other, so as to form an inclined under surface which will conform to the felly and make the tapered fit described.

Old Troubles Pointed Out

"Owing to the impracticability of making a perfectly circular metallic tire or tire-base that will have a close and perfect fit over a metallic circular felly or rim, it is the usual custom either to cut the tire, so as to make free ends, or to make it in two parts and apply it to the wheel, or to force it thereon under pressure. With metallic bands or tires not so applied great difficulty is acquired in producing a close fit between the parts and in removing the band or tire after it has been placed in position.

Provides Remedies

"With the tapered base and felly of my construction is attaching the base to the felly the larger circumference of the base can be easily slipped over the small outer circumference of the felly and forced over the inclined surface of the latter into proper position. When in place, these wedge-shaped surfaces form a close fit and also resist any tendency of further inward movement of the band on the felly, due to strain on the tire in turning corners. By this locking action, strain on the securing-bolts of the band will be greatly relieved. In removing the band it is merely necessary to back off the base slightly from the felly, when it can be easily slipped down and off the inclined surface.

Tire Vulcanized to Base

"In constructing my improvement the tire is vulcanized upon the tire-base, and a shoulder or rib 2 is formed on each side of the tire to rest upon the folded edge 3 of the base, thus furnishing an additional support for the tire and tending to prevent chafing of the same. The rubber at the shoulders is extended down and vulcanized on and over the folded edge of the base to form an elastic edge of the tire at that point, whereby when the tire is subjected to a lateral strain or distortion at that point, as on turning the vehicle a short corner, such strain or distortion is taken up by such elastic joint and strain and tearing or loosening of that portion of the tire vulcanized to the face of the base is entirely prevented.

Prevents Creeping

"As shown, 4 and 5 are annular clamp-rings adapted to be secured upon the opposite sides of the felly and projecting outward to bear upon and engage the tire-base. These clamps are preferably secured in place by means of bolts 6 passing through the felly and the rings. To prevent the tire-base from "creeping" or slipping circumferentially between the clamp-rings, I prefer to provide upon the rings studs or projections 7, which enter correspondingly sockets or openings in the tire-base and firmly anchor the latter in place."

Claims Are Strong

There are six strong claims allowed to this patent, of which the first and fourth are as follows:

"1. In combination with a pneumatic tire circular in cross-section and wheel-felly, a base consisting of an annular endless metal rim, its outer face or periphery of the base conforming to the shape of the inner periphery of the tire and the inner periphery of the base conforming to the face of the wheel-felly, means for detachably securing the said base to the tire, the entire surface of the tire that is in contact with the base vulcanized thereto, substantially as described."

"4. In combination with a tapered felly, a tire, an annular base to which said tire is secured, said base having a tapered under surface and fitted on said felly, substantially as described."

Second Patent

No. 638,589, to Louis De F. Munger of New York, N. Y., assignor to the National Wheel & Traction Co., same place.—This is the second of the series of patents for Munger's inventions and contains the most valuable feature, although that feature is shown in what will doubtless prove its more desirable form in the succeeding patent. Drawing from the description of the patent papers:

"It is desirable in a pneumatic tire,

particularly for heavy traction purposes, that means be provided for the protection of the tire from injury in case of puncturing and deflating and also against the sudden abnormal strain or shock of excessive pressure at one point, as when the wheel meets a sharp obstruction, as well as against the destructive strain of overload.

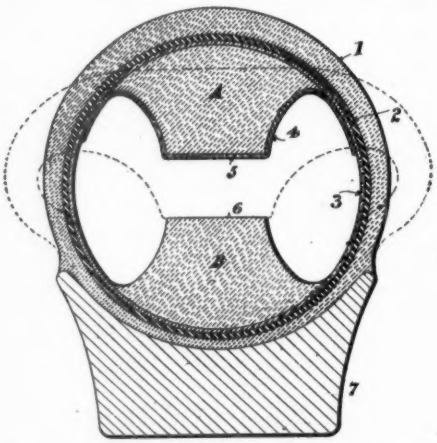
Interior Buffer-Ribs.

"To this end my invention consists in adapting to the ordinary pneumatic tire substantially circular in cross-section oppositely-disposed interior buffer ribs or cushions, one being adjacent the tread of the tire and the other the inner periphery of the tire which lies in the wheel-rim. These buffer-ribs are preferably of about the same form and dimensions and have adjacent parallel faces sufficiently separated to be normally out of contact. They are, however, positioned near enough to each other so that if the tire strikes against a sharp obstruction it will indent until the ribs are brought into contact with each other, and thus receive the load in the same manner as a solid rubber tire for the time being without permitting the tire to entirely collapse, so as to injure its side walls. The ribs therefore serve the same functions in respect to the tire that elastic cushions do for spring vehicles.

Like Solid Rubber Tires

"Similarly in case of the deflating of the tire or when the vehicle is overloaded the ribs will be brought into contact and will carry the load like solid-rubber tires without injury to the tube or rim of the wheel. It is further to be noted that the mass of the outer rib serves to thicken the tread of the tire, so as to serve as an additional precaution against puncturing. As a further safeguard the inner surface of the outer rib is covered with an impervious lining or coating vulcanized to the inner wall of the tube on each side. Thus the tire has the double protection of the ordinary inner tube outside of the outer rib and the connected coating or lining for the other face of the rib. Hence if a tire be punctured through the lining-tube air cannot pass through the porous mass of the rib, because of its impervious lining.

"My invention is especially adapted to a pneumatic tire, in contradistinction to a cushion-tire, and must have on its inner periphery the air-tight lining referred to, which is composed of about ninety-five per cent of pure rubber, and this inner lining in my tire must be formed on and be substantially an integral part of the tire itself in order to maintain a rigid connection of the buffers and tire and hold them in rigid relative position, so as to prevent collapsing and distortion of the tire and prevent the buffers from sliding over and crushing down within the spaces around the buffers, and the spaces on the sides of the buffers must extend to the inner edges of the tire in order to maintain at all times air-spaces around the buffers.



Munger's Combination Pneumatic and Cushion Tire.

"The preferred form of the ribs is shown in the drawing, in which the adjacent faces are shown flat, although, if desired, a different contour may be given so long as the surfaces are parallel, the load or pressure being thus distributed over the entire area of their adjacent faces when brought into contact.

Form of Ribs Shown

"The accompanying drawing forms part of this specification and shows my improved tire in cross-section. It is of the ordinary type, substantially circular in cross-section and with side walls of substantially uniform thickness. The exterior layer of material is indicated by 1, while 2 represents the layer of fabric, and 3 the inner or air-tight tube.

"A and B, respectively, represent the

cushion or buffer ribs, oppositely disposed and longitudinally extended in the tire and made integral with the tire. The rib A is arranged adjacent to the tread and the rib B adjacent to the inner periphery of the tire or the wheel-rim 7. The inner surface of the rib A is preferably provided with the impervious lining 4, vulcanized on either side to the tube 3 and of like material, as an additional safeguard against leakage from a puncture through the tread of the tire.

"The dotted lines illustrate the distortion of the tire when by reason of overload or deflation of the tire the buffer-ribs are brought into contact and serve the function of a solid-rubber or cushion tire.

Air Chambers Remain

"By my construction a perfectly sealed pneumatic tire of the ordinary closed tubular shape and having the usual continuous air-space therein is formed, and in my tire the air-spaces formed at the sides of the buffers and between the same and the edges of the tire correspond exactly to the air-cushion that is formed in an ordinary pneumatic tire when the same is under pressure and the central part depressed, so as to leave supporting-cushions of air on either side of the central part. Hence it will be seen, owing to the form and size of the air-spaces, that the buffers will not destroy the cushioning power of the air, but the resiliency and buoyancy of the ordinary pneumatic tire will be retained.

Differ From Cushion Tires

"My invention therefore consists, essentially, of improvements in a pneumatic tire and differs materially from those cushion-tires in which a small interior hole is provided to give a greater resiliency to the tire, as the spaces in the latter are provided to enable the tire to yield and collapse, while the spaces in my tire are provided to contain air under pressure, by means of which the too-ready yielding of the tire is prevented, and which spaces correspond to the air space of an ordinary pneumatic tire. My tire differs, however, from the ordinary pneumatic tire in providing by the addition of the buffer a thickened tread surface which will not flatten out to as great a degree and will therefore offer less frictional resistance to the ground."

Claims Allowed

This patent carries three claims, of which the third is as follows:

"A combined cushion and pneumatic tire, comprising an outer tube, its impervious lining, a pair of cushion ribs arranged within the same, one adjacent the tread and the other adjacent the wheel-rim and having parallel adjacent faces, and an impervious lining or coating covering the inner surface of the outer rib and joined to the lining of the tube, substantially as and for the purposes specified."

Third Patent

No. 638,590, to Louis De F. Munger of New York, N. Y., assignor to National Wheel & Traction Co., same place.—The third patent of the Munger series covers what is substantially a combination of the two ideas contained in the two foregoing descriptions and shows variations of the ideas described in the first and an amplification of the idea described in the second, which includes an interlocking of the adjacent faces of the ribs of the tire.

Interlocking Ribs

"The conformation of the meeting places of the ribs is such," says the patent, "as to cause them to interlock and prevent lateral displacement of one upon the other, and consequent lateral distortion of the tire, as would be the case if the ribs slipped out of engagement with each other, permitting the tire to collapse, which would readily occur when the vehicle was turning a corner or traveling upon a lateral incline. The preferred form in cross-section of the ribs is shown in the accompanying drawings, in which one is provided with V-shaped grove and the other with a corresponding shaped tendon to fit the same."

After describing, in much the same language as used in 628,588, the device for attaching the tire to the felly, the patent continues:

Description of Parts

"The tire A is made up of a compound structure of an exterior layer or tread 2 of rubber, layers of fabric or

cloth 3, inner air-tube 4, buffer-ribs 5 and 6, and supplementary inner air-tube 7, which covers the inner surface of the buffer-ribs 5 and has its edge vulcanized upon the tube 4, thus forming a further protection against leakage from any rupture or puncture through the tread of the tire. The upper tread-rib 5 is V-shaped, or it may be rounded or of other suitable form that will give a central depending ridge and side walls. The base-buffer rib 6 has a conversely shaped groove to receive the tread-buffer, so that the latter will enter the base-buffer and be interlocked therewith, so as to prevent lateral displacement of the buffers and distortion of the tire.

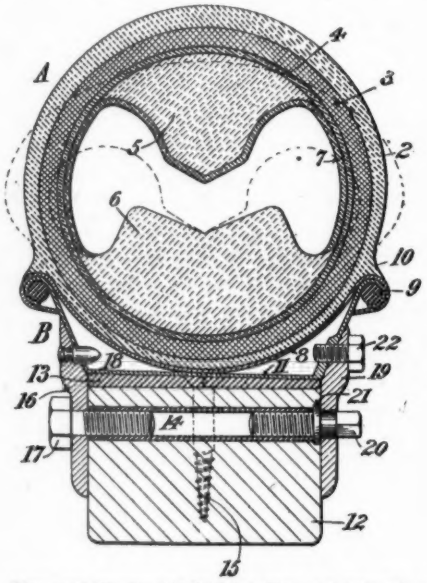
Shape of Air-Spaces

"Between and around the buffers are air-spaces which extend to the edges of the side walls of the tire and between the buffers and the edges of the tire and are substantially elliptical in form. The outer side wall of each air-space is thus parallel for its whole length with the outer periphery of the tire, and the center of the elliptical spaces is slightly above the center of the tire, so that when the tire is depressed and the buffers are in contact these centers will coincide. By these features when the buffers are pressed into contact the side walls of the tire will be bent in a perfect curve and the side spaces into substantially circular form. The shape and size of these air-spaces will give practically the same effect as the air-space in an ordinary pneumatic tire when the central tread-surface is depressed and elliptical air-cushions formed on either side thereof. The buffers 5 and 6 are made integral with the tire.

Construction of Rim

"The rim B is made up of the concave annular ring 8, conforming to the curvature or shape of the inner periphery of the tire, and to which the latter is permanently vulcanized. The edges of the ring 8 are outturned to embrace a strengthening wire 9, the tire being perferably provided with soft-rubber shoulders or ribs 10, lying over the edges of the ring 8 and vulcanized thereto. These ribs strengthen the connection in case of lateral strain and tend to prevent breaking away of the tire from the rim and resultant chafing.

"In order to fit the rim to the wheel-felly, I preferably attach to the ring 8 another sheet-metal ring 11, shaped to the periphery of the felly 12 and with its edges turned over the wire 9, inside of the rolled edges of the ring 8, the rings being brazed together at their points of contact, if desired, to make the connection more secure, as along their medial line. The ring 11 is seated upon the steel tire 13 upon the face of the felly 12, which tire is slightly beveled or inclined, as shown, whereby the tire and rim can be readily slipped on and off the wheel. I provide the wheel-felly with a series of



Munger's Pneumatic-Cushion Tire and Attaching Device.

transverse interiorly-threaded tubes or sleeves 14, anchored in place by means of wood-screws 15, which serve also to hold in place the steel tire 13.

Detaching the Tire

"An annular clamping-ring 16 is permanently attached to the inner or body side of the wheel by means of the bolts 17, threaded into the sleeves 14. The ring 16 also has studs 18, permanently secured thereto and adapted to enter holes or sockets in the rim B. On the outer side of the wheel I arrange a smaller clamping-ring 19, adapted to be slipped upon the wheel after the tire is in place and to be held thereon by means of bolts 17, (not shown,) threaded into alternating

sleeves 14, and to be removed from the wheel by a series of backing-off bolts 20, alternating with the bolts 17, and having shoulders 21 engaging the inner face of the ring 19, whereby the bolts 20 on being unscrewed will carry the ring 19 off from the wheel. The ring 19 is secured to the wheel-rim B by means of bolts or screws 22, so that when the annular ring 19 is drawn off from the wheel by means of the backing-off screws 20 the tire and rim are drawn off with it.

Attaching the Tire

"The operations of attaching and detaching the tire are obvious from the foregoing construction. The bolts 20 are screwed home into their respective sleeves. The annular ring 19 is then applied and secured to the rim by means of the screws or bolts 22 and the whole then driven into place by means of the bolts 17, alternating with the bolts 20. In removing the tire the bolts 17 are first removed, and then by unscrewing the bolts 20 the ring 19 and the connecting-rim B and tire A are drawn off the felly.

Functions of the Tire

"In use with a light or ordinary load the tire acts as a simple pneumatic tire. In case, however, of excessive load or a partial deflation of the tire the buffer 5 becomes seated upon and engages with the buffer 6, opposite the bearing-point of the wheel upon the pavement, and the tire is thus prevented from entirely collapsing or receiving injury by lateral distortion."

Seven Claims Allowed

This patent has seven claims, of which the first, fourth and sixth are as follows:

"1. A non-collapsible pneumatic tire, circular in cross-section, provided with interiorly, oppositely-disposed surfaces formed on the inner periphery of the tire with air-spaces between and around them and extending entirely across the tire to the air-tube, said surfaces provided with means to engage and interlock, whereby collapsing and lateral distortion of the tire are prevented, substantially as described."

"4. As an improved article of manufacture, a tire of the class described, having an annular metal ring conforming to its inner periphery, and with all the contacting surface permanently vulcanized thereto, the ribs or shoulders on the tire overlapping and vulcanized to the edges of the rim, the strengthening wire in the rim edges, and the annular ring conforming to the face of the wheel-felly and fitted thereto and permanently attached to the ring vulcanized to the tire, and adapted to be detachably connected to the wheel."

"6. In connection with a tire, a felly, a detachable tire-rim, means for fastening said rim to the felly consisting of clamping-bolts and removing-bolts having shoulders interior the ring substantially as described."

LICENSES FOR SOCIETY MEN

The steam automobile is responsible for a plebeian innovation in society, says the New York Journal. Within the past month several New York millionaires and sons of millionaires, all prominent in society, have put aside golf sticks, and yachts, and polo ponies, and devoting themselves assiduously to the study of injectors, pumps, tubular boilers and steam engines, have been rewarded, after successfully passing an examination at police headquarters, each with an engineer's license just like "Bill," who runs the elevator engine in the cellar.

It has all been done so quietly and quickly that the Engineers' Union has not yet recovered from the shock of surprise caused when a walking delegate announced at the last meeting that Alfred Gwynne Vanderbilt and Harry Paine Whitney had actually been granted licenses, and thus added to the competition in their own special field of labor. The union doesn't know what to do about the society engineers, and will probably hold another meeting to decide whether to allow them to run their own "locos" without joining the union, or to begin an agitation against them as "scabs."

It all came about through the decision

of the police board some weeks ago that under the law no locomobile could be operated in the city until the boilers were first tested and the persons operating them duly examined as to their ability as engineers. As the motive power of locomobiles is steam, and jurisdiction over them is the province of the police under the law, the boiler of every locomobile must be officially tested and the operator licensed in the steam boiler inspection bureau of the police department.

This bureau is under the supervision of Sergeant Frank Mangin, Jr. The examiners are Policemen John Lynch and Patrick Beckingham, both practical engineers, detailed for that work. They have already examined and licensed the following gentlemen, who have abandoned electricity and gasoline in their autos for steam:

Alfred G. Vanderbilt, Harry Payne Whitney, Charles E. Proctor, A. R. Shattuck, son-in-law of former Mayor Strong; Amzi L. Barber, of the Barber Asphalt Company, and E. H. Lyons.

The examination is entirely oral, and lasts about forty minutes. It is not so technical as the one engineers of large boilers are required to pass.

According to the examiners all of the applicants thus far have acquitted themselves creditably, especially Messrs. Vanderbilt and Whitney.

Sergeant Mangin in explaining the workings of the bureau, said that eight licenses had been granted for locomobile engineers, and twenty applications had been received for tests. Those who pass are given a special license, which must be renewed at the end of a year. The license is a large, imposing steel engraved document, with the words "Engineer's Certificate" in large black letters at the top.

THE AUTOMOBILE DRAY

She's er waitin' in de cornder,
Lookin' at de t'ings dat pass,
'Ca'se dey's opined wide de stable,
An' dey's tu'ned her out ter grass,

Wid de harness scars all healin',
Wid de lame foot soun' an' well;
But dar's er sorrer at 'er heart
Ole Jinny'll nebber tell.

Dough she hain't er proud-bred creeter,
Dough she's des er ole muel mar',
De mizry tuggin' in her chist
Is mo'n she kin b'ar,

Ca'se she feel de life erbout her,
An' she hear de bells dat ring,
An' see de drays an' kyarts dat go
'Dout any livin' t'ing.

An' she wait dar in de cornder,
Wid de peart worl's passin' by;
She'd drap er tear fer sorrer
If er Jinny muel could cry.

Men done git too smart fer Jinny,
Er de Jinny get too slow;
An' dey git some debil notion
Fer ter mek de wagins go.

Wid er herry an' er skerry
Hatter sen' gray ha'rs ter school;
Des er-leabin' in de dirt road
Dis er nigger an' er muel.

Dey done gone an' lef' you, Jinny;
Gone an' lef' you sho 'nuff now,
An' hit ain't no easin' ter you
Fer ter hitch you ter er plow;

'Ca'se dey shove an' keep er shovin',
Hain't er gwine ter leabe dat long,
An' de ole fiel' gwine ter miss you,
Wid de nigger an' de song.

—Virginia Frazier Boyle in the Memphis Scimiter.

PATENT OFFICE GLEANINGS

THE POSITION OF THE MOTOR AGE IN REGARD TO THE HANDLING OF PATENTS—WORTHLESS PATENTS ARE IGNORED—GRANT'S COMPLICATED CONTRIBUTION—CLEVER HUB AND STEERING CONNECTION

In response to inquiries from several sources, The Motor Age begs to state that it does not believe it advisable to waste its space nor the time of its readers with lengthy descriptions of patents to which little or no value attaches. The editorial force is not infallible, however, and therefore gives really more space to the consideration of patents than may be really advisable, fearing to overlook some good device. Occasionally, also, a description of one is given, which, while not so broad as to show any really novel ideas, still exhibits ingenuity in the combination of mechanical devices. Such patents are easily circumvented and afford comparatively little protection to the inventors. The following is of that type:

Grant's Vehicle

No. 638,331, to William Wallace Grant, New York, N. Y.—This is a voluminous document, covering no less than eight pages of specifications, accompanied by five sheets of drawings and twelve figures. The length of the document can be understood after reading what it purports to cover—which is pretty much everything in connection with the motive power and running gear of autos. There is material for at least half a dozen different patents in this one, and most patent attorneys would have insisted in having the various devices which have no real bearing on each other covered by separate patents.

Covers Many Devices

The various details covered, to quote from the specifications, "are to provide simple and efficient means for transmitting and for regulating the transmission of power from a motor to the driving-wheels of the vehicle; to provide for the easy control of the speed and direction of the vehicle; to provide simple means whereby to differentiate or vary the angles taken by the steering-wheels relatively to each other; to provide differential gearing which shall possess the qualities of safety and strength; to provide for proportioning the elements of a charge with which to operate the motor and controlling the same, whereby to effect variable speeds in the running of the vehicle; to provide a motor-vehicle with a gas-motor; to provide a construction of steering-wheel which shall insure the easy and safe steering of the vehicle, and to so construct a motor-vehicle that the mechanism shall be comparatively noiseless when in operation and so that various parts of said mechanism can be readily adjusted relatively to each other."

Two Speed Regulators

The inventor provides for two methods of regulating the speed of the vehicle, one through the power-transmission device and the other through the motor, somewhat oddly, especially as he claims any speed forward or backward can be obtained through the gearing.

This latter is shown in Fig. 1. The power is transferred from the motor to a shaft carrying the wheels 4 and 5, which serve as both gear-wheels and fly-wheels. Wheel 4 is fitted with a groove 6 for the reception of some frictional material and also with a ring of frictional material 7. This wheel 4 actuates the horizontal friction disc 8. The friction idler 17 is interposed between the wheel 5 and the flange 15 of the horizontal friction disc 8 to assist in transmitting the power to the latter.

Sliding Friction Gear

A drum 19, directly under the friction disc 8 is provided with an encircling band 20 of frictional material which may be slid along the drum by means of a shipper 21. The central bearing parts of the friction disc 8 are countersunk so that where the band 20 is under the center of the disc, as shown in the dotted lines, the drum 19 is at rest. Sliding the band 20 to the right of the center of the friction disc imparts a reverse motion to the drum and a backward motion to the ve-

hicle. While there are some elements of value in this device, it is scarcely excusable to twice transmit the power by friction. Once is bad enough.

The shipper 21 is controlled through cords or straps which connect with a drum on the controlling lever, which is provided with a hand-wheel, by revolving

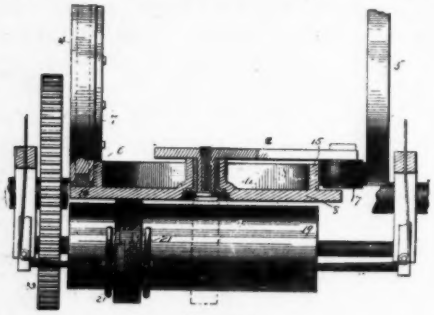


Figure 1.

which the vehicle can be started, speed increased or diminished and the vehicle stopped or reversed. This lever also controls the steering by a backward and forward motion, as described further on, and is provided with a push button for ringing an electric bell. Of course it is hollow.

Steering Device

The steering device which is shown in Figs. 2 and 3 is ingenious.

"The front axle of the vehicle," says the specifications, "is rigidly secured to the framework, and the hubs 55 of the front steering-wheels are mounted to revolve at the respective ends of said front axle and to be pivotally connected therewith. One head of each hub 55 may be made integral with the peripheral portion thereof, and the other head 57 is preferably screwed therein and secured by suitable set-screws.

Hinges Inside of Axle

"The front axle is provided at its ends with heads 58, and encircling each head is a collar 59, having inwardly-projecting bosses 60 at diametrically opposite points. These bosses are provided with passages 61 for the reception of pins 62, passing through the head 58 of the axle, and thus the hubs of the steering-wheels are pivotally connected with the ends of the front axle. One end of the collar 59 has a bearing against the fixed head of the hub and its other end has a bearing against the removable head or ring 57. Within the annular space between the peripheral wall of the hub and the collar 59 antifriction-rollers 63 are disposed and prevented from endwise displacement by the heads of the hub. Each hub is provided with peripheral flanges 64, to which the spokes of the wheels are secured. Each collar 59 is provided with L-shaped levers 65, the

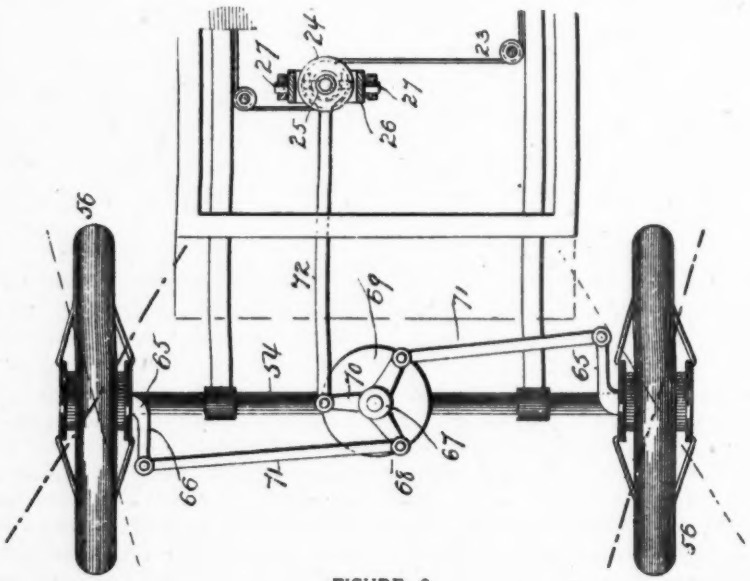


FIGURE 2.

arms 66 of which project normally at right angles to the axle and in opposite directions therefrom.

Arrangement of Links

"A lever 67 is pivotally mounted on the front axle centrally between the ends thereof, and may consist of a disk having

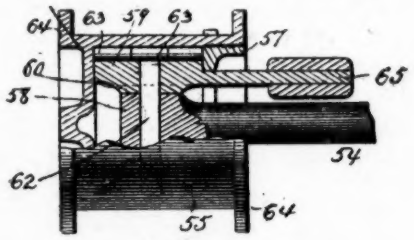


Figure 3.

three points of attachment for links or a disk having three strengthening-ribs, or it may consist merely of three arms 68, 69, and 70, integral with each other and pivotally supported at a common point on the axle.

"The arms 68 and 69 are connected with the L-shaped levers 65 by means of links 71. It will be observed that the arms 68 and 69 of lever 67 project laterally from their pivotal connection with the axle and also laterally with respect to the longitudinal axis of the vehicle. In other words, the two arms 68 and 69 form an obtuse angle, and each arm forms, with the axle, an acute angle, and the arms 66 are of such length as to cause the ends of the links 71 connecting upon the arms 66 to be farther away from this axle 54 than are those ends of the links connecting upon the arms 68 and 69, thus throwing the links 71 out of parallel with the axle.

Angles of Wheels

"From this construction and arrangement of parts it will be seen that when the lever 67 is turned one of the steering-wheels will be turned farther on its pivotal support than the other, so as to facilitate the turning of the vehicle, the wheel which marks the inner curve on which the vehicle turns being disposed at a different angle to the axle than the wheel which marks the outer curve. For instance, suppose that the lever-arm 70 be caused to move inwardly toward the vehicle-body until lever-arm 69 and its connecting-link 71 align. Thereupon the hub connected therewith will swing or turn through a less distance than the other hub, which has connection with arm 68, because the link 71 connecting with arm 68 will move through a greater distance longitudinally than will the link connecting the arm 69, and so when the arm 70 is moved outwardly in a direction

Odd Steering Movement

away from the vehicle-body the link connecting with arm 68 will move through a shorter distance than will the link connecting upon arm 69. Hence the wheel connecting with arm 68 will turn or swing a less distance than will the wheel connecting with arm 69.

"The arm 70 of lever 67 is connected by means of a link 72 with trunnions 733, projecting from a collar 74, mounted to rotate on the lower end of the controller-lever 25, said collar 74 being prevented from displacement by means of fixed collars 75. Thus it will be seen that by moving the lever forwardly or rearwardly on its intermediate trunnions the hubs of the steering-wheels will be turned on their pivotal connections with the front axle, and the vehicle can be accurately and easily guided and controlled.

Overcomes Obstacles

"By the arrangement shown in Fig. 6 the steering-sleeve is designed to swing laterally, while the other parts of the wheel are adapted to revolve above it,

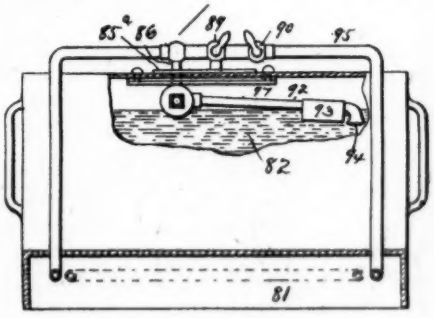


Figure 4.

thus making steering easy and making obstacles in the path of the wheels less to be apprehended than would a construction of wheel provided to swing outside the hub."

Grant's vehicle is designed to run with power furnished by a hydrocarbon motor, the fuel-tank of which is located in a hol-

low dash-board, shown in Fig. 4. This is heated by means of pipes under the tank by the exhaust from the motor.

Regulating Explosive Charge

The pipes and valves shown in Figs. 4 and 5 provide for the regulation of the explosive charge, both as to quality and volume. The air enters the passage 86, and, through the hinged pipe 92, sprays the air through the perforated end 94 of the pipe into the hydrocarbon liquid, the nozzle being maintained in the proper position by the float 93. The impregnated air issues through the opening 87 at the top of the tank. By means of the valve 89 part of the unimpregnated air may be allowed to mix with that that has passed through the oil, thus regulating the quality of the charge. The valve 90 governs the amount of the charge, regardless of quality, that may be drawn into the engine cylinder with which pipe 95 connects.

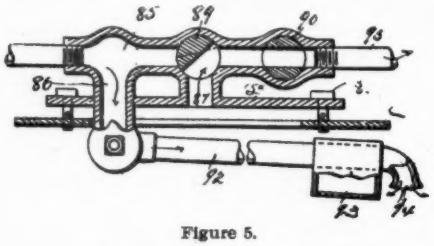
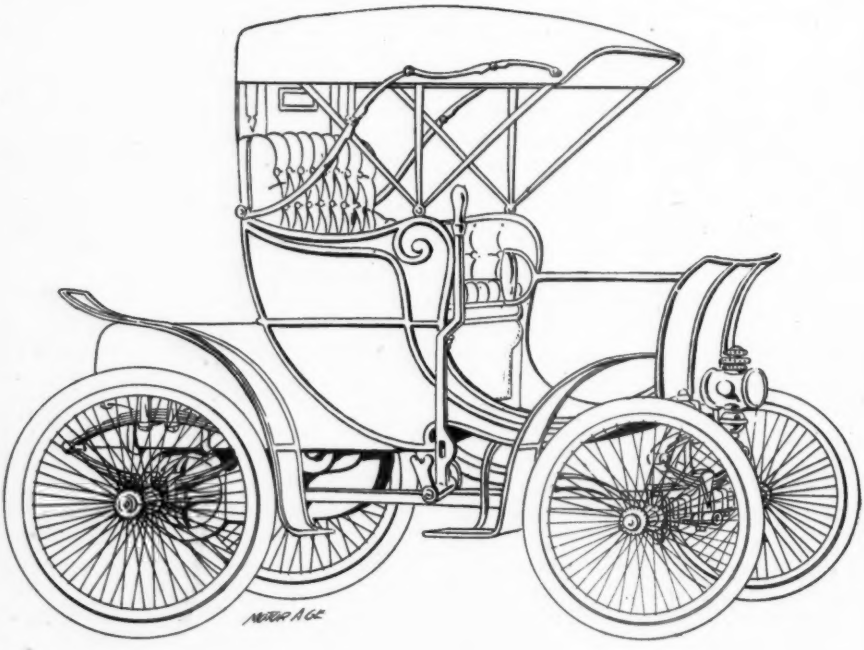


Figure 5.

There are no less than thirty-one claims allowed in this patent, none of which, however, are broad.

THE DETROIT AUTOMOBILE



The above illustration shows the hydrocarbon Phaeton of the Detroit Automobile Co. The illustration on the front cover shows the surrey made by the same company.

REVIEW OF ENGLISH SHOWS

TWO ANNUAL EXHIBITS SHOW THAT THE BRITISH ARE FOLLOWING FRENCH METHODS OF CONSTRUCTION—CONSPICUOUS ABSENCE OF STEAM AND ELECTRIC VEHICLES—NOVELTIES DESCRIBED

The two English cycle and automobile shows have come and gone and the public has had an opportunity of studying all that is novel in self-propelled vehicles. The shows were noteworthy for the large number of exhibitors of vehicles and parts and the general interest taken by the public in studying the different forms of construction. English made vehicles are making rapid progress in the race for public favor, but foreign machines, especially the French, German and American, come in for much favorable comment and are selling rapidly at good prices.

But One American Vehicle

The Stanley steam carriage was the only American built vehicle on exhibition and received flattering praise from the prominent trade press as well as a large share of public admiration. The French machines were few in number, the Renault, Peugeot and Petit Duc being the principal ones on exhibition, while the Benz carriage of Germany and the Bollee pattern tricycle made by Bachtold & Co. of Steckborn, Switzerland, made up the foreign exhibits. Nearly all these were shown by London dealers and were exhibited in company with other makes or parts.

Electrics Not in Favor

Strange to say, the electric vehicle plays an unimportant part in either exhibition, only one being shown, and that at the Stanley show, by C. Oppermann, London. Numerous small exhibits of electrical parts and fittings were made, but the complete vehicle seems to have few admirers. This appears all the more strange when the good roads of the country are considered.

The hydrocarbon motor plays the all important part, as is proven by the number of exhibitors. Out of approximately ninety-one exhibitors of vehicles and parts all but two were hydrocarbon motor driven.

That such a large percentage of vehicles should be driven by one form of motive power shows one thing: The French have taught the English a great deal in the construction of self-propelled vehicles and Englishmen have been ready purchasers of the good things produced by their French rivals. The Britishers have saved time and money by buying what was good instead of attempting to copy, and have adopted the De Dion or a licensed motor in the large majority of their vehicles, producing serviceable articles from the start. Therein lies the advantage of the English manufacturer in having something to sell; he has had nothing to do but build a carriage around a successful motor, while in America a successful motor is hard to find and when found cannot be purchased.

De Dion Motor Prominent

The De Dion is the prominent motor used in England, and where the original De Dion is not used, one similar is provided, showing that the English are following the French most implicitly. One or two samples of other forms are mentioned as being exhibited on vehicles, but details are lacking so that a definite idea as to their construction cannot be gained. One, however, was a motor of "a two-cylinder type, the cylinders being horizontal and opposite, working on the same crank shaft." Another was the Daimler, which is already known in America. The Benz engine comes in for a few English built imitations, while one car, the vibrationless International, is driven by a "two-cylinder tandem motor of nine and a half horse-power, made throughout in England, water-jacketed, with solid ends."

In the case of the first double cylinder motor above mentioned, it is placed crosswise of the vehicle, the driving shaft running longitudinally. As both connecting rods are attached to the same crank, vibration must necessarily be great, as it is impossible to counterbalance the weight of the two pistons so

they will act smoothly. It would seem better practice, from an American point of view, to connect one piston to a crank working opposite to the other, thereby making one balance the other.

Carburetting Device

A special carburetter was shown on the Star carriage made by the Star Motor Co., Wolverhampton, in which the gasoline is mixed with the air by atomization rather than in the form of vapor. By the use of this carburetter the air and gas mixing mechanism is done away with and the engine is entirely controlled by means of the throttle valve and ignition.

Another small but vital part to receive attention was a sparking-plug shown by a Mr. Wellington in which the porcelain was made short as possible, and through which a German silver tube was carried to prevent any deposit of carbon on the points.

Contact Breaker

A feature in motor construction in connection with a tricycle exhibited by W. H. M. Burgess, Ltd., London, was a contact breaker in which departure has been made from the standard De Dion pattern. Instead of the cam working directly on the trembler, a lever is introduced, thus relieving the spring of a considerable amount of work. The compression tap is fitted with a small handle only. The usual connection to the front of the frame acts on the exhaust valve, enabling it to be held up to relieve the compression when starting the machine or when running down hill. This feature is a valuable one where used, as in this case, on a De Dion or similar motor in a tricycle or quadricycle.

Belt Driving Popular

Another feature which seems to have a strong hold on the British constructor is the belt drive, the majority of vehicles larger than the cycle type being so driven. This form of drive is used on the Benz carriage, and, on account of its being a popular vehicle and a good one, too, its method of transmission has been extensively copied. A few spur gears and chains are used, but belts seem to have the preference. This form of transmission has received but scant courtesy at the hands of American makers.

Wheel brakes seem to play as small a part in the English vehicle as does the electric carriage in the two shows, the band variety being almost universally used.

Wire Wheels Used

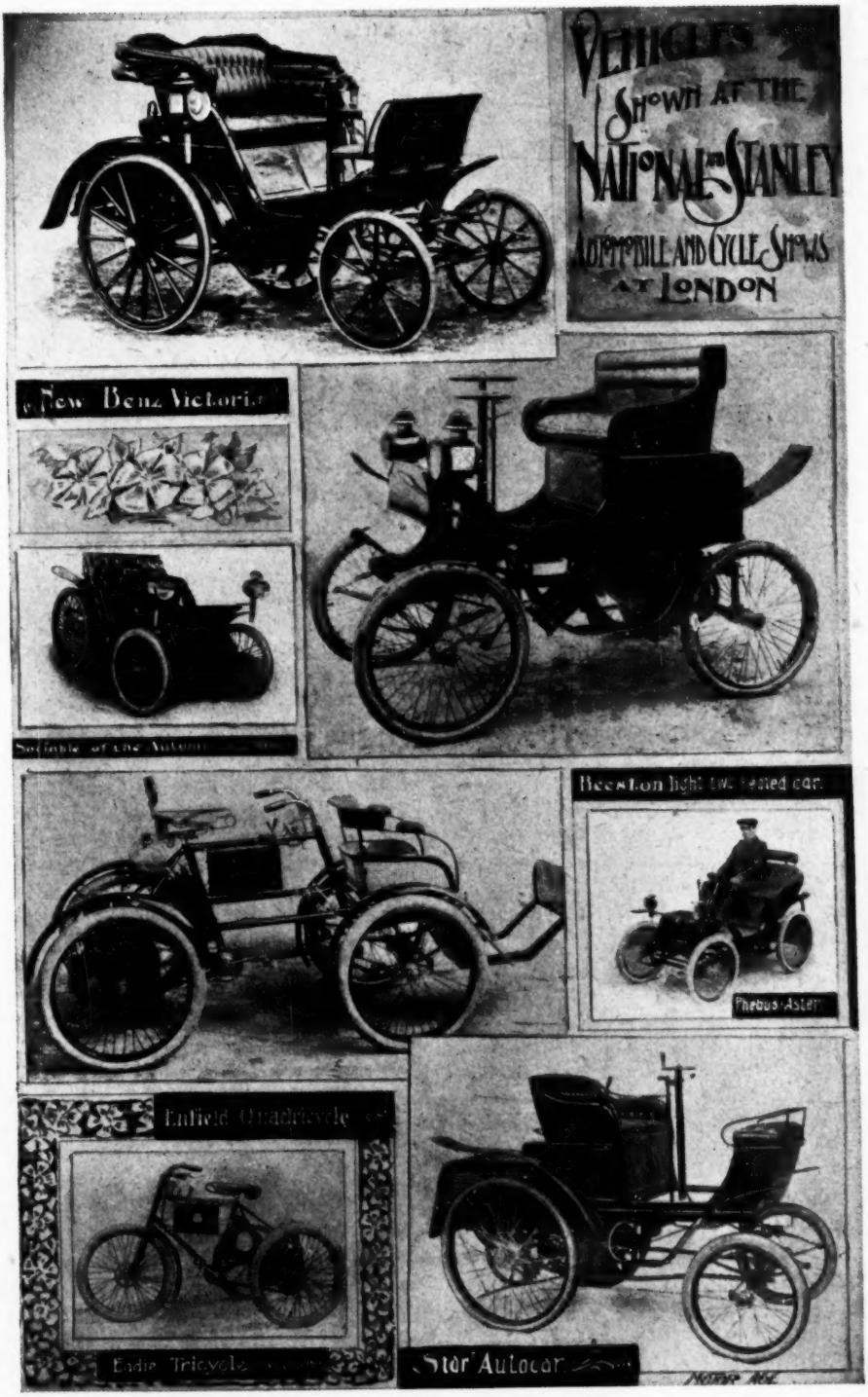
Suspension wheels, or, as they are termed across the water, cycle-built-wheels, were fitted to all vehicles exhibited, with one or two exceptions. The wire-spoked tangent wheel seems to have become the accepted form abroad, although there are many makers who still use the wood. One prominent reason for the wire wheel being so popular is the good roads which abound throughout the country and which allow of small diameter wheels being used. The vehicle bodies are set closer to the ground thereby and steadier riding is produced as little vibration is occasioned by the roadway. The motor is responsible for the major portion of it.

The Daimler Co., however, use nothing but wooden wheels, it is understood, and have no fault to find with them whatever. As this company is one of the most prominent in Europe its experience in this line is worthy of attention.

Appearance of Vehicles

The general outlines of the English carriage, some of which are illustrated in this issue, show ideas that are entirely foreign to anything produced in America. The ideas seem to follow somewhat those of the continental builders, yet have enough originality about them to disprove any continental connection. Exception to this may be made in relation to the tricycles and quadracycles, nearly all of which are upon lines standardized by De Dion and other prominent French makers. What changes have been made show truly English thought and reasoning, for they mostly tend toward simplicity. Where the French three or four wheeled motor cycle has a great complication of parts the English have tried to simplify, and this shows what eventually will bring the business to the western side of the channel. Simplicity combined with the superior workmanship will eventually win.

Another thing that may add to the English prestige in the future is that work done now is done well, hence will


VEHICLES
SHOWN AT THE
NATIONAL AND STANLEY
AUTOMOBILE AND CYCLE SHOWS
AT LONDON
New Benz Victoria
Enfield Quadricycle
Eadie Tricycle
Star Autocar

be a constant tribute to the craftsman of the present day, whose work will no doubt be emulated in more modern form in the time to come.

Tires and Parts

Tires, chains and saddles have prominent places at both shows.

The Detachable form of tire is about the only kind shown. The Dunlop and Clipper companies seem to be making the greatest effort to get the vehicle business in pneumatics, but have numerous competitors in other styles. There are other pneumatics, but they are not so prominently placed before the trade as are the two mentioned. The Dunlop is too well known to need description, and the Clipper may be described by stating that it is similar in a way to the G. & J. as made in America; although differing in structural details.

Chains are supplied by the different cycle chain makers in all sizes, running from standard cycle chain dimensions to blocks three inches by three inches, the latter for the heaviest form of steam driven van.

AIR SHIPS AND AUTOS

Away back in the days of the dim and almost dead past—in the days when Chicago used to have an annual Inter-State Exposition, each fall—there was a flying machine shown in the big lake-front building.

It was only a working model of what promised to be but the precursor of machine that would carry mankind through the blue ether at will. It consisted of a large cigar shaped balloon, below which was hung a car, designed, in the full sized device, to be for the accommodation of passengers. There was a screw or fan at the rear as well as a rudder. Tethered by a cable, the flying machine was allowed to rise above the booths in the exposition building and sail around in the air. All Chicago was awe stricken. The working model showed so well that it was only a question of making a machine large enough to enable a man—or a dozen or a hundred of them—to sail through the air.

People waited and waited for the finished machine but it came not. No doubt there are people, to-day, who wonder why the completed machine has never been soaring through the smoke laden air of the western metropolis. But there were reasons, as will appear.

To approach the subject from another standpoint, which will show its connection with a paper devoted to motor vehicles, a man recently flew over from Europe, as the statement was made to a representative of this paper, landed and within two weeks there was organized a New Jersey corporation for $70,000,000.00 known as the Anglo-American Fast Motor Company. The man who accomplished this and then departed from these shores, all within two weeks, was the same one who built the flying machine shown at Chicago. There is where the connection comes in.

The gentleman who called at the Motor Age office, looking for information as to the various companies who would furnish estimates on the speedy building of 10,000 automobiles or such parts of them as their facilities justified them in handling for strictly spot cash with order, stated that he was the representative of the man who had organized the mammoth company.

"He is a nervous man, you know," said this representative. "When he was talking with the capitalists, he would pace up and down the room, shove his hands down in his trousers pockets and bring them out full of loose diamonds and juggle them in the air. He is an exceedingly nervous man."

No doubt great things may be expected from this company, which is organized

to make motors for autos, not flying machines.

In writing of the flying machine, an oversight was made in not stating that the screw at the end of the air ship was very much, in appearance, like the common ventilating fans that are so common nowadays. Within the exhibit booth strange to say, was a resistance coil, a rheostat and various other electrical appliances, to one end of which was attached a wire leading from the Exposition lighting plant, and from the other end of which led another wire through the cable to which the air ship was tethered.

It was also an oversight not to mention that he "flew" in an ocean greyhound, not an airship.

It may be well to add that the name of the great inventor and financier is Pennington.

SHORTAGE OF CELLS

The battery makers in the automobile trade are face to face with a condition of affairs that cannot but have a retarding influence on the material progress of the business for some time to come. It is the shortage of vulcanite rubber cells, the manufacture of which is now controlled by the rubber trust and which is inadequate to the demands.

Orders that were placed last spring have not been filled to date and no definite promise will be made as to when cells will be supplied, firms having to await their turn in the order in which their orders were placed.

In Chicago alone thousands of these cells are wanted, and how the shortage will be met is a question that will cause no little inconvenience.

In the face of this, the recent announcement made by the Woods Motor Vehicle Co., Chicago, to the effect that a large number of cabs would soon be placed on the streets for public service caused no little comment in battery making circles. Mr. Woods informed a representative of the Motor Age that he had calls for the new vehicles already in stock but that orders the company had placed within the last two or three months, which amount to about 400 sets, will not be delivered until some time next spring—just when is not known.

It is the same with battery makers outside the motor vehicle industry. One and all are waiting patiently for cells, while the rubber trust is taking its own time in filling orders, knowing full well that no other concern has the facilities for producing in quantity.

The Crowdus company is also being held up for want of cells, goods ordered last spring being still undelivered.

It seems that if ever an opportunity afforded itself for the profitable investment of capital that opportunity is now at hand. The existing condition cannot be readily relieved on account of the growing demand for rubber goods of all kinds and the difficulty in securing the crude material, yet the manufacturers might meet the abnormal demand in a measure by increasing facilities or licensing other manufacturers.

Monopoly knows nothing, though but the greatest independence, and that is the position the Rubber Goods Co. has taken.

PROBLEMS WORKED OUT

DESBRIPTION OF A POPULAR FRENCH WATER COOLING DEVICE OF TUBES AND RADIATION FINS—A GASOLINE MOTOR WITH BOTH EXTERIOR AND INTERIOR COOLING DEVICES—A HIGH COMPRESSION HYDROCARBON ENGINE

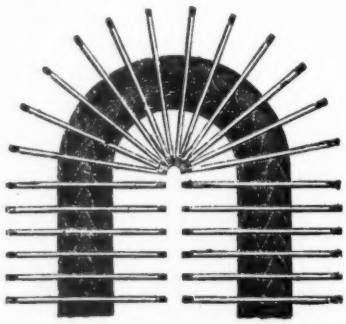
WATER COOLING DEVICE

A French concern that advertises to have sold 4,000 of its cooling devices, offers the style shown in the accompanying illustrations, which has surely proven popular. As will be seen by reference to the cuts, the device is made of tubes provided with fins for the radiation of the heat, which are arranged in coils, as shown, and may be in one or more rows, according to the amount of cooling required. Elbow connections, as shown in the smaller cut, are used to connect the lengths of tube.

The tubes are of copper and the fins are of either cast or wrought iron or aluminum. The tubes are of two sizes, those of an interior diameter of fifteen millimeters (a trifle less than half an inch), designed for motors of eight-horse power or less, and those of a diameter of eighteen millimeters (about 45-64ths of an inch), for motors of more than eight-horse power. The smaller tubes are provided with fins sixty millimeters across (about 2 23-64 inches), and the larger ones have fins of seventy millimeters (about 2¾ inches).

The price charged for the smaller tubes with fins, per meter (3 feet 3 3-8 inches), is $2.00, $2.20 and $2.80 for cast iron, wrought iron and aluminum fins. Elbow joints cost 20 cents for half round, and 10 cents for quarter round. The prices for the larger tubes and joints are fifty per cent higher.

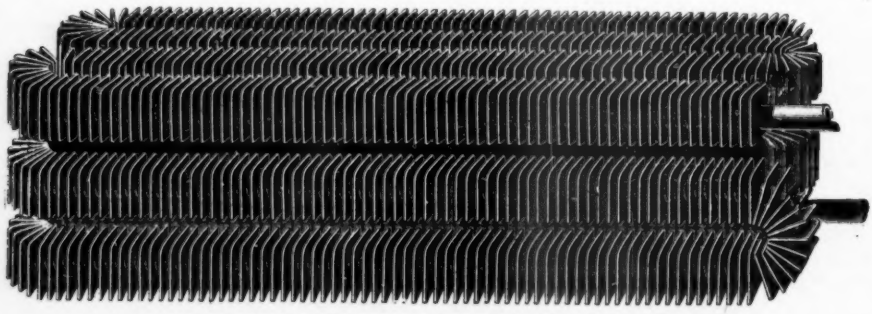
The weights of the smaller tubes are .875 kilograms (1.925 pounds) per meter



Half-round Joint of Cooling Tubes.

with aluminum fins and 1.275 kilograms (2.805 pounds) with iron fins; the larger tubes weigh 1.22 kilograms (2.684 pounds) and 1.820 kilograms (4.001 pounds) with aluminum and iron fins, respectively.

In placing the cooling device in the vehicle, the builder is instructed to place the fins parallel to the longitude of the vehicle to give the greatest circulation



FRENCH COOLING TUBES WITH RADIATION FINS.

of air. Preferably the heated water should be pumped from the cylinder jacket into the top portion of the cooling device and the cooled water flow from the bottom thereof into the tank.

INTERIOR COOLING MOTOR

The trial of motors organized at Aubervilliers under the patronage of La Locomotion Automobile, says that paper, have called much attention to the motor shown by the Minerva company (Societe La Minerve), which was one of a number which that firm has, at present, under construction.

The novelty of this motor consists of interior cooling, in addition to the ordinary method of cooling by means of radial fins, without affecting the heat of the motor enough to interfere with its efficiency, and with much more certainty than with only the outer fins.

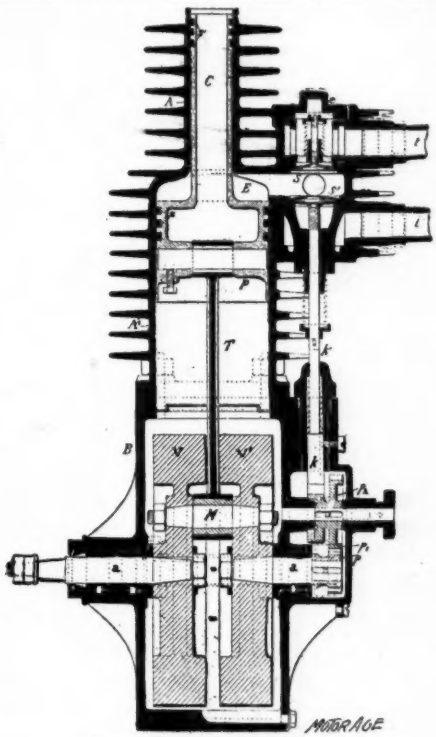
As shown in the accompanying illustration, the upper part of the piston P is extended in the form of a chimney C, which forms a secondary smaller piston which slides in the auxiliary cylinder A1 which is correspondingly smaller than the principal cylinder A.

In this manner the interior of the piston P, and through it, the enclosed chamber B are in direct communication with the outer air, which is drawn in and driven out through the chimney C by the backward and forward movements of the piston. This arrangement assures the perfect cooling of the motor and permits sufficiently high compression without heat. The motors of this style are designed to give a compression of 4.5 kilograms (about sixty-four pounds to the square inch) without the maximum temperature passing 280 degrees (about 300 degrees Fahrenheit), after a certain time reaching a fixed cut-off.

In similar manner the motors for motor-cycles and "voiturettes" are cooled by the circulation of air through the fins, reinforced by interior cooling to prevent the temperature rising above 150 degrees (280 Fahrenheit), after several hours' work.

The other parts of the Minerva motor are about the same as those of other similar motors. They have been the object of careful study and all parts subjected to friction are made of tempered steel.

The piston is made air tight by the packing rings s and s1 mounted on the large and small pistons, the same as in ordinary motors. The connecting rod T acting through the crank M revolves the flywheels V, V, which are wedged on the tapered motor shaft and are contained in the closed chamber B. The



Minerva Interior Cooling Motor.

shaft a carries at its end the pinion p which actuates the pinions p1 and p2. These latter actuate the cam k, which governs the spindle k1 of the admission valve. The exhaust valve S is likewise automatic and the valve-seats are easily inspected through the screw-cap e. The ignition is electrical.

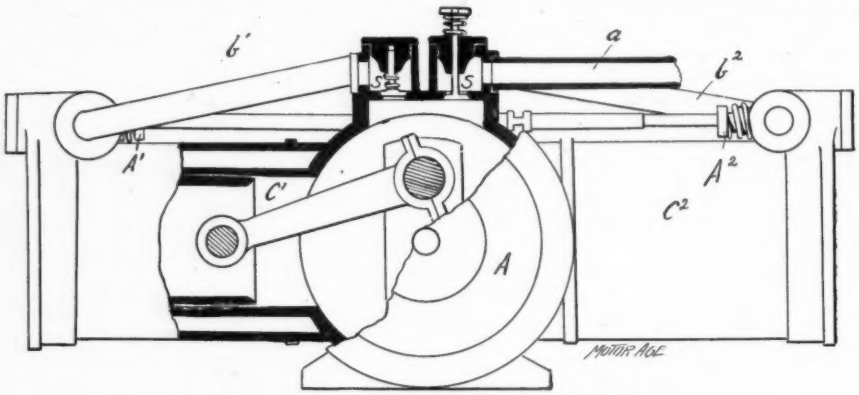
A special lubricating device assures the perfect lubrication of the auxiliary chimney-piston.

HIGH COMPRESSION ENGINE

The accompanying illustration shows the principles of an explosive engine recently invented by H. Crouan of Clinchy,

France. The object of the invention is to provide a supply of explosive mixture that is under a moderate compression and is drawn into the explosive chambers of the cylinders to be further compressed by the action of the pistons.

The two cylinders C1 and C2 are set opposite to each other and open into the closed drum A. The explosive mixture enters this drum through the valve S from the pipe a, and, as the two pistons are simultaneously moved forward, being attached to opposite cranks on a common axle, the explosive mixture is compressed. At the same time one or the other of the two valves A1 and A2, connecting with the cylinders through the pipes b1 and B2, opens, allowing the mixture to be both sucked and forced in one of the cylinders C1 and C2. The compression in the drum A being greater than the expansion permitted by the opening of one of the valves into one of the cylinders, that cylinder is filled, when it is at the extreme point of the charging stroke, with a mixture already under more than atmospheric pressure and when the compression stroke is completed, the compression is correspondingly greater than in the ordinary hydrocarbon engine, and the force of the explosion is, accordingly, greater.



CROUAN'S HIGH COMPRESSION ENGINE.

MINOR NEWS AND COMMENT

LOZIER MAKING MOTORS

A company for the manufacture of automobiles and launches of all kinds will soon be organized, says the Cleveland Leader. E. R. Lozier and George Burrell are at the bottom of the project. The launches and the automobiles will, for the present time, be made at the Lozier bicycle works in Toledo. Mr. Lozier has for a long time been experimenting on making automobiles.

The launches first occupied the minds of the Loziers about two years ago. Mr. Burrell, who has control of the department for the manufacture of the bicycles, two years ago bought one of the finest launches that was on the market. In his opinion the launch was a crude affair and he began perfecting it and making changes. He finally destroyed the launch entirely and built a new one on the plans mapped out by himself. The company is now prepared to build any kind of a launch from one propelled by naphtha to one operated by electricity.

H. A. Lozier is preparing to retire this winter from active business and permit his son to become the active manager. He stated yesterday that he was reaching the age when he would like to get much enjoyment out of life, as he had worked for many years. He expects to close his business inside of a month and go south or west to escape the severe winter

weather of Cleveland, as he is a sufferer from catarrh. He also stated yesterday that a large city has made a flattering offer for the company to establish a launch building and automobile constructing factory there. The factory, however, for the present will remain in Toledo.

E. R. Lozier will go to Toledo to take charge of the sales department of the automobile and launch factory, and George Burrell will be in charge of the factory.

A MILWAUKEE CONCERN

Milwaukee, Wis., Dec. 11.—The Milwaukee Automobile company, with a capital stock of $100,000, was incorporated a few days ago, the incorporators being W. H. Starkweather, formerly of the Milwaukee Engineering company, which has passed into the American Bicycle Co., W. G. Smith and Herman Pfeil. The company will use the factory on St. Paul avenue formerly occupied by the Milwaukee Engineering Company, and expects to begin the manufacture of light two-seated passenger automobiles about Jan. 1. Mr. Starkweather refuses to give the names of the stockholders, but he says the capital has all been paid in.

"I have been making experiments for more than a year," said Mr. Starkweather, "and with some other patents that have developed in the city I believe we will be able to turn out a light, cheap and efficient automobile, one with considerable traveling capacity. The first kind that we shall turn our attention to will be a sort of a tourists' two-seated runabout, with a wooden box and suspension wheels. It will be light and strong, capable of climbing all grades up to thirty degrees. The motor power will be steam and of an average of six horse-power. It is our intention to manufacture automobiles for passenger and freight transportation. We shall follow up the tourists' automobile with a double-seated one and then a wagon for light delivery and one for heavy teaming work." Mr. Starkweather declined to say what patents the company would use.

In addition to the company C. S. Smith is bending his energies to automobile experimenting and is building a large factory building for that purpose on Thirty-second and Vliet streets.

AUTO-TRUCK TESTED

The Auto-Truck Co. has tested its first truck. The vehicle is sixteen feet long and weighs eight tons, and is designed to carry a load of ten tons. The air engine is rated at 100 horse-power and it is claimed that enough compressed air is carried to last fifteen hours.

The company is one in which Richard Croker, Lewis Nixon and ex-Senator Gorman are interested. In speaking of the truck Mr. Croker is quoted as follows:

"The truck I saw in company with Senator Gorman and Lewis Nixon has a capacity of 100 horse-power for fifteen hours and can carry 20,000 pounds. It was handled splendidly. The air was stored under some disadvantages, as our plant for such purposes is not exactly suited to our requirements.

"In developing this truck, the compressed air motor has been created anew. The problem was greater than it was first supposed to be, but to see 100 horse-power on a sixteen-foot truck responding instantly to the man at the wheel, starting, stopping, backing and turning, is more than encouraging."

EXAMINATIONS IN CHICAGO

The ordinance passed by the city council of Chicago on July 6, requiring all users of autos to pass an examination and take out licenses before being permitted to use the city streets, has lain dormant up to the present time. A committee composed of City Engineer Ericsson, City Electrician Ellicott and Health Commissioner Reynolds was appointed by Mayor Harrison to draft a form of examination and to conduct examinations. A hitch rose in the proceedings of the committee, owing to the fact that each of the three members wished one of the others to assume the chairmanship and major portion of the criticisms that are sure to be poured on the members. At last, however, the committee has gotten to work with Mr. Ellicott as chairman, and has promised to have a form of examination

ready this week. It follows that users of autos will be obliged to have licenses in the near future, for which they will be required to pay $3. From the opinions expressed by the members of the committee, however, it is probable that the examination will not be a difficult one.

COMPRESSED AIR COMBINE

The Compressed Air Motor Co. of Chicago announces that the American Air-Power Co. has ordered three Hardy motors for use on the Whitney cross-town lines in New York. The Hardy motor has been in use for several months on the North Chicago lines, and is reported to be a complete success. It is owned by the Chicago company, and has been developed as the chief rival of the Knight-Hoadley motor of the Whitney company. The recent election of H. H. Vreeland to the presidency of the Air Power Co. and the order for Hardy motors is supposed to indicate a change of policy which will result in the absorption of the western concern and the adoption of its patents for traction motors. The American Air-Power Co. is now the largest individual owner of the Chicago company's stock.

NOTES OF INTEREST

Philadelphia boasts the first exclusive motor-cab service for a hotel. The Lafayette Hotel of that city has arranged with the Pennsylvania Vehicle Co. for cabs that will be held for the exclusive use of patrons of the hotel and will bear the name of the hotel on the vehicle.

A. A. Zimmerman, the former bicycle champion, together with his father and Henry Fournier, a well known French cyclist, were recently arrested in New York for riding an auto faster than the law allows. Scorchers will be scorchers.

Fire Chief Croker of New York has been refused the privilege of running his steam auto through Central park. "Too noisy," said Commissioner Clausen. Being the son of a political "boss" isn't everything.

The Messerer Automobile Co. had articles of incorporation recorded in Newark, N. J., recently. It will manufacture automobiles of every description. The capital stock is $300,000, of which $2,200 has been paid in by Stephen Messerer, Joseph Fisch, Julius E. Seitz and Adolph Goldfinger, all of Newark.

The Boston Transcript asserts that while it takes "money to make the mare go," it takes a lot more to make the auto go, judging from the capitalization of the various companies.

George Alexander Hamilton of Buffalo is busily engaged in trying to get together $5,000,000 to form an auto trust. His efforts pale beside the $75,000,000 and $200,000,000 ventures.

The United States Automotor Co. has been organized under New Jersey laws with a capital of $1,000,000 to operate vehicles and vessels with compressed air or other power.

Herbert Catrow of Miamisburg,, Ohio, threatens to start an automobile factory at that place. He expects to use gasoline for the motive power of his vehicles.

H. R. Ilingworth and Joseph Lanz of the Utica (N. Y.) Gas Engine Co., have adapted a motor to auto uses and have patents pending on their invention.

In the tournament of roses, held annually at Pasadena, Cal., the auto will be featured this year, being given a prominent place in the parade.

An exchange says that the assertion that the horse is to be supplanted was greeted with a chorus of neighs from the Madison Square horse show.

James C. Church is at the head of an enterprise to operate a system of auto-'buses in Brooklyn. He hopes to be in operation early next spring.

It is rumored that Alexander Winton will enter the auto race in connection with the Paris exposition next year.

A fender for autos has been utilized—in the newspapers. It looks like a misguided hoopskirt.

A Philadelphia newspaper has introduced the auto into service for quick delivery of papers.

The latest: An automobile street sweeper. French, of course.

New Haven, Conn., is to have an electric omnibus line.

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THE MOTOR AGE furnishes all the news of value to users and builders of Motor Vehicles of all types.

THE MOTOR AGE *does not* cumber its pages with vague descriptions of unmechanical and useless inventions and devices.

THE MOTOR AGE has capable forces in both the editorial and illustrating departments which select and utilize the useful and instructive and discard the valueless.

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